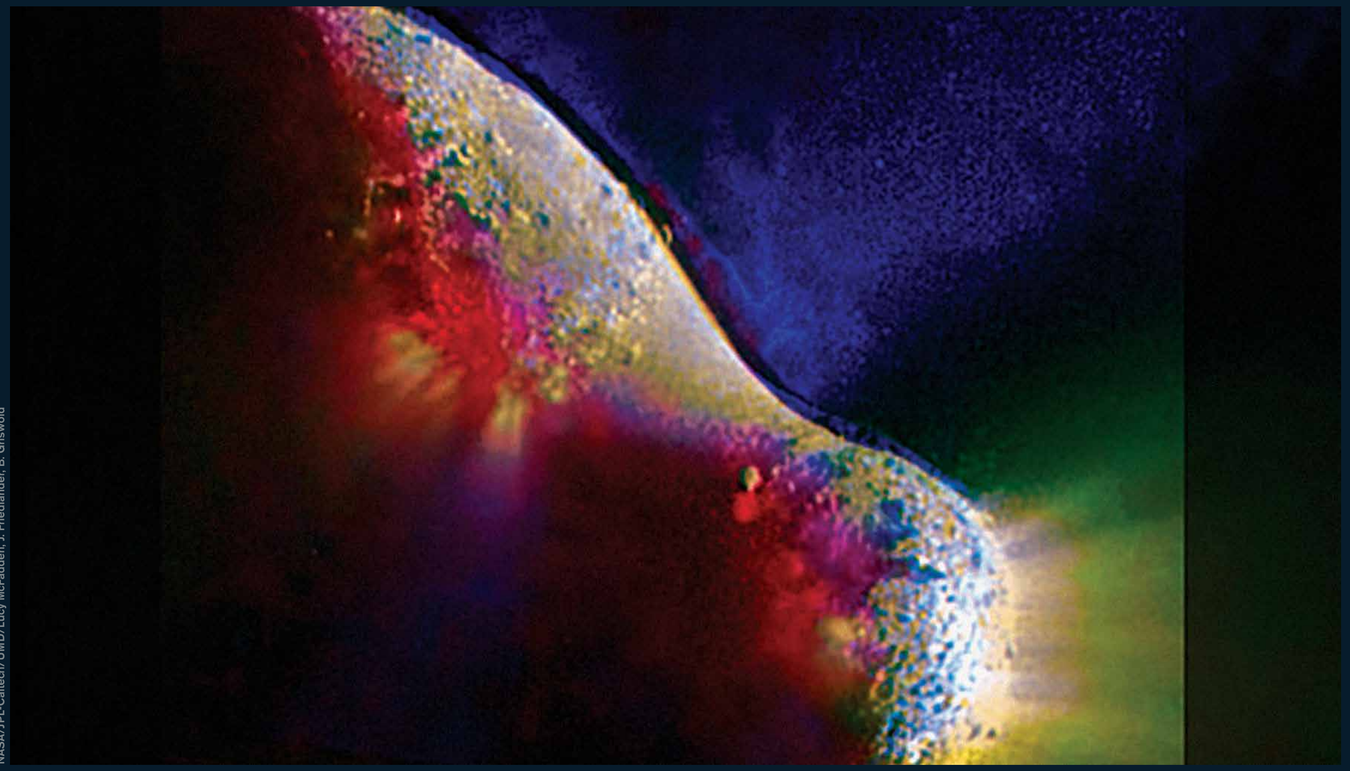
STATION 06 Goddard Initiatives

Cometary Compositions Reflect Diverse Origins

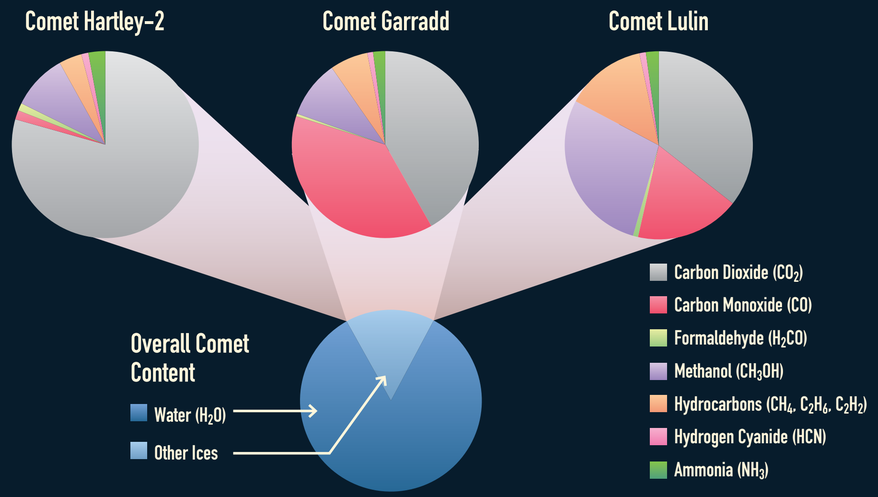
Comet nuclei are about 50-50 composed of ices (water, dry ice and others) and rocky minerals, while asteroids are richer in minerals. Goddard scientists investigate cometary ices by measuring the gases released from the nucleus. They find that comets are highly diverse in their organic (for example: methanol, ethane, methane) and nitrogen-containing ices (hydrogen cyanide, ammonia), whether the comets reside in the Oort Cloud or the Kuiper Belt.



NASA/JPL-Caltech/UMD/Lucy McFadden, J. Friedlander, B. Griswold

COMET HARTLEY-2: This false-color image of the nucleus of Hartley-2 shows jets of water vapor (blue), CO_2 (green) and dust (yellow). The ices of the measured gases are not mixed uniformly in the nucleus of this comet.

The Diversity of Cometary Ices



Comets and asteroids delivered much of the water, and building blocks of life, to our planet. The fraction of each delivered in this way is under intense study. Importantly, the isotopic compositions of water are the same in comet Hartley-2 and in Earth's oceans, but other comets are different. Did comets just like Hartley-2 deliver Earth's oceans?

DID YOU KNOW?

A comet nucleus could serve as a rich resource for a future space colony. A comet of 1 kilometer diameter contains about 500 million cubic meters of material, or about 250 million metric tons of ice and mineral-rich dust, enough to supply a colony with fuel, water, metals and food for a very long time.